DEPARTMENT OF THE ARMY EM 1110-2-3104 U. S. Army Corps of Engineers Washington, DC, 20314-1000

CEEC-ED

Engineer Manual No. 1110-2-3104

30 June 1989

Engineering and Design STRUCTURAL AND ARCHITECTURAL DESIGN OF PUMPING STATIONS

Table of Contents

		Subject Pa	ragraph	<u>Page</u>
CHAPTER	1.	INTRODUCTION		
		Purpose and Scope	1-1	1-1
		Applicability	1-2	1-1
		References	1-3	1-1
		Rescission	1-4	1-2
CHAPTER	2.	GENERAL REQUIREMENTS		
		Location	2-1	2-1
		Size	2 – 2	2 – 1
		General Configuration and Site Work	2 – 3	2 – 1
		Design Life	2 - 4	2 – 2
		Seismic Defensive Design	2 – 5	2 – 2
		Alternative Studies	2 – 6	2 – 2
		Design Coordination	2 – 7	2 – 2
CHAPTER	3.	ARCHITECTURAL DESIGN		
		General Architectural Considerations	3-1	3-1
		Safety	3 – 2	3 – 3
		Types of Construction	3 – 3	3 – 3
		Architectural Designs	3 – 4	3 – 3
		Roofing	3 – 5	3 – 5
		Windows and Skylights	3 – 6	3 – 6
		Doors	3 – 7	3 – 7
		Stairways	3 – 8	3 – 7
		Toilet Facilities	3 – 9	3 – 7
		Sheet and Miscellaneous Metal	3 – 1 0	3 – 8
		Interior Finishes	3 – 1 1	3 – 8
		Built-in Furniture	3 – 1 2	3 – 8
		Screening	3 – 1 3	3 – 8

Table of Contents (Continued)

	Subject	<u>Paragraph</u>	<u>Page</u>
CHAPTER 4.	STRUCTURAL ANALYSIS AND DESIGN		
	Foundations	4-1	4-1
	Primary Structural Components	4-2	4-3
	Structural Loads	4-3	4-6
	Loading Conditions and Design Criteria	4-4	4-11
	Stability	4-5	4-13
	Design Stresses	4-6	4-14
	Miscellaneous Features	4-7	4 - 14
	Appurtenant Structures and Facilities	4-8	4-18

Table of Contents (Continued)

List of Plates

Description	Plate <u>No</u> .
Design Network Diagram	1
Typical Open Forebay Type Pumping Station With Over the Levee Type Discharge	2
Typical Open Forebay Type Pumping Station - Superstructure and Trash Deck	3
Typical Open Forebay Type Pumping Station - Substructure	4
Urban Industrial Installation With Floodwall Type Flood Protection	5
Large Urban Pumping Station - Superstructure, Trash Deck, and Operating Floor	6
Large Urban Pumping Station - Substructure, Pump Floor, Forebay, and Intake Sump Area	7
Large Civil Pumping Installation - Operating Floor, Forebay Deck, Superstructure, and Quarters Area	8
Large Civil Pumping Installation - Equipment Floor, Forebay, Sump Area, and Discharge Area	9

Table of Contents (Continued)

<u>List of Appendices</u>

	Subject	<u>Paqe</u>
APPENDIX A	PHOTOGRAPHIC ARCHITECTURAL ILLUSTRATIONS	A-1
APPENDIX B.	FLOTATION STABILITY	B-l
APPENDIX C.	DESIGN GUIDANCE FOR CONDUITS THROUGH LEVEES	C-1